

Appl. No. 10/618,258
Amdt. Dated October 13, 2004
Reply to Office Action of September 13, 2004

Attorney Docket No. 81788.0252
Customer No.: 26021

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A MEMS (micro electro mechanical system) apparatus comprising:
 - a light-emitting circuit, having a light-emitting device, to emit light;
 - a light-receiving circuit having a series circuit of series-connected light-receiving devices that receive the emitted light to generate a voltage; and
 - a MEMS assembly driven by the generated voltage.
2. (Original) The MEMS apparatus according to claim 1, wherein the MEMS assembly includes an RF-MEMS switch.
3. (Original) The MEMS apparatus according to claim 1, wherein the MEMS assembly includes series-connected RF-MEMS switches.
4. (Original) The MEMS apparatus according to claim 2, wherein the MEMS assembly includes wiring impedance matched with the RF-MEMS switch.
5. (Withdrawn) The MEMS apparatus according to claim 1, wherein the MEMS assembly includes a first RF-MEMS switch and a second RF-MEMS switch connected in series, and a third RF-MEMS switch, an end of the third RF-MEMS switch being connected to a node of the first and the second RF-MEMS switches, another end of the third RF-MEMS switch being grounded.

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6. (Withdrawn) The MEMS apparatus according to claim 1, wherein the MEMS assembly includes parallel-connected RF-MEMS switches.

7. (Withdrawn) The MEMS apparatus according to claim 1, wherein the MEMS assembly includes an RF-MEMS switch having a switching contact.

8. (Withdrawn) The MEMS apparatus according to claim 1, wherein the MEMS apparatus is packaged, the light-emitting device and the light-receiving circuit being optically coupled through a silicon optical tube.

9. (Currently Amended) The MEMS apparatus according to claim 1 further comprising a discharging circuit to discharge a voltage generated across the series circuit when emission of light from the light-emitting circuit is brought ~~in~~ into a halt.

10. (Original) The MEMS apparatus according to claim 9, wherein the discharging circuit includes a junction field-effect transistor, a drain of the transistor being connected to a high-potential terminal of the light-receiving circuit via a first resistor, a gate of the transistor being connected to the high-potential terminal via a second resistor, and a source of the transistor being connected to a low-potential terminal of the light-receiving circuit.

11. (Withdrawn) The MEMS apparatus according to claim 1, wherein the light-receiving circuit and the MEMS assembly are fabricated on a semiconductor chip, the light emitting circuit and the light-receiving circuit being optically coupled via a photocoupler.

12. (Withdrawn) The MEMS apparatus according to claim 1, wherein the light-receiving circuit and the MEMS assembly are fabricated on a semiconductor chip, the light emitting circuit and the light-receiving circuit being optically coupled via a photoguide.

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13. (Withdrawn) A MEMS (micro electro mechanical system) apparatus comprising:

- a first light-emitting circuit, having a first light-emitting device, to emit light;
- a second light-emitting circuit, having a second light-emitting device, to emit light;
- a first light-receiving circuit having a series circuit of series-connected light-receiving devices that receive the light emitted from the first light-emitting circuit, to generate a voltage;
- a second light-receiving circuit having a series circuit of series-connected light-receiving devices that receive the light emitted from the second light-emitting circuit, to generate a voltage;
- a discharging circuit to discharge a voltage generated across the series circuit of the second light-receiving circuit when emission of light from the second light-emitting circuit is brought in a halt;
- a MEMS assembly including an RF-MEMS switch having a first electrode connected to a high-potential terminal of the first light-receiving circuit and a second electrode;
- a resistive element provided between the first and second electrodes; and
- a MOS switch, a drain of the MOS switch being connected to the second electrode, a source of the MOS switch being connected to a low-potential terminal of the first light-receiving circuit, and a gate of the MOS switch being connected to a high-potential terminal of the second light-receiving circuit via the discharging circuit.

14. (Withdrawn) The MEMS apparatus according to claim 13, wherein the MEMS assembly includes an RF-MEMS switch.

15. (Withdrawn) The MEMS apparatus according to claim 13, wherein the MEMS assembly includes series-connected RF-MEMS switches.

16. (Withdrawn) The MEMS apparatus according to claim 14, wherein the MEMS assembly includes wiring impedance matched with the RF-MEMS switch.

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17. (Withdrawn) The MEMS apparatus according to claim 13, wherein the MEMS assembly includes a first RF-MEMS switch and a second RF-MEMS switch connected in series, and a third RF-MEMS switch, an end of the third RF-MEMS switch being connected to a node of the first and the second RF-MEMS switches, another end of the third RF-MEMS switch being grounded.

18. (Withdrawn) The MEMS apparatus according to claim 13, wherein the MEMS assembly includes parallel-connected RF-MEMS switches.

19. (Withdrawn) The MEMS apparatus according to claim 13, wherein the MEMS assembly includes an RF-MEMS switch having a switching contact.

20. (Withdrawn) The MEMS apparatus according to claim 13, wherein the MEMS apparatus is packaged, the light-emitting device and the light-receiving circuit being optically coupled through a silicon optical tube.

21. (Withdrawn) A MEMS (micro electro mechanical system) apparatus comprising:

a light-emitting circuit, having a light-emitting device, to emit light;

a first light-receiving circuit having a first series circuit of series-connected light-receiving devices that receive the light emitted from the light-emitting circuit, to generate a voltage;

a second light-receiving circuit having a second series circuit of series-connected light-receiving devices that receive the light emitted from the light-emitting circuit, to generate a voltage, a high-potential terminal of the second series circuit being connected to a low-potential terminal of the first light-receiving circuit;

a resistive element connected in parallel to the first light-receiving circuit;

a junction field-effect transistor, a drain of the transistor being connected to the high-potential terminal of the second series circuit, a source of the transistor being connected to a low-

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potential terminal of the second series circuit, and a gate of the transistor being connected to a high-potential terminal of the first series circuit; and

a MEMS assembly driven by the voltage generated by the second light-receiving circuit.

22. (Withdrawn) The MEMS apparatus according to claim 21, wherein the MEMS assembly includes an RF-MEMS switch.

23. (Withdrawn) The MEMS apparatus according to claim 21, wherein the MEMS assembly includes series-connected RF-MEMS switches.

24. (Withdrawn) The MEMS apparatus according to claim 22, wherein the MEMS assembly includes wring impedance matched with the RF-MEMS switch.

25. (Withdrawn) The MEMS apparatus according to claim 21, wherein the MEMS assembly includes a first RF-MEMS switch and a second RF-MEMS switch connected in series, and a third RF-MEMS switch, an end of the third RF-MEMS switch being connected to a node of the first and the second RF-MEMS switches, another end of the third RF-MEMS switch being grounded.

26. (Withdrawn) The MEMS apparatus according to claim 21, wherein the MEMS assembly includes parallel-connected RF-MEMS switches.

27. (Withdrawn) The MEMS apparatus according to claim 21, wherein the MEMS assembly includes an RF-MEMS switch having a switching contact.

28. (Withdrawn) The MEMS apparatus according to claim 21, wherein the MEMS apparatus is packaged, the light-emitting device and each light-receiving circuit being optically coupled through a silicon optical tube.

29. (Withdrawn) The MEMS apparatus according to claim 21 further comprising a discharging circuit to discharge a voltage generated across the series circuit of each light-receiving circuit when emission of light from the light-emitting circuit is brought in a halt.

30. (Withdrawn) The MEMS apparatus according to claim 29, wherein the discharging circuit includes a junction field effect transistor, a drain of the transistor being connected to a high-potential terminal of each light-receiving circuit via a first resistor, a gate of the transistor being connected to the high-potential terminal via a second resistor, and a gate of the transistor being connected to a low-potential terminal of each light-receiving circuit.

31. (Withdrawn) The MEMS apparatus according to claim 21, wherein each light-receiving circuit and the MEMS assembly are fabricated on a semiconductor chip, the light emitting circuit and each light-receiving circuit being optically coupled via a photocoupler.

32. (New) The MEMS apparatus according to claim 1, wherein the MEMS assembly includes a MEMS mirror.

33. (New) The MEMS apparatus according to claim 1, wherein the MEMS assembly includes a MEMS optical switch.

34. (New) The MEMS apparatus according to claim 1, wherein the MEMS assembly includes a MEMS actuator.